

REMARKS

Status of Application

Claims 1-12 and 31-40 are pending in the application. Claim 12 stands rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Claims 1-3, 7, and 31-32 stand rejected under 35 U.S.C. § 102(b) as anticipated by the Williams article. Claims 4-6, 8-12, 33-35, and 37-40 stand rejected under 35 U.S.C. § 103(a) as unpatentable over the Williams article in view of Mooradian (U.S. 5,782,770) and Lillquist (4,751,571). Applicants note that no ground of rejection is specifically provided for claim 36.

With this response, claims 1-6 and 9-12 are amended, claims 7-8 and 31-40 are canceled, and claims 41-53 are newly added. No new matter is added by amendment. Support for the amendments to claim 1 and new claims 42 and 43 may be found, for example, at page 12 of the specification. Support for the amendments to claims 2-6 and 9-12 may be found, for example, in those claims as originally filed. Support for new claims 41, 44 may be found, for example, at page 10 of the specification. Support for new claim 45 may be found, for example, at page 14 of the specification. Support for new claim 46 may be found, for example, in original claim 24. Support for new claim 47 may be found, for example, in original claim 30. Support for new claims 49 and 50 may be found, for example, in Figure 1. Support for new claims 51-53 may be found, for example, at page 15 of the specification.

Additionally, the specification is amended to recite this application's relationship to its priority applications, and a formal drawing for Figure 1 is submitted. Applicant notes that an Official Filing Receipt has not yet been mailed for this application, and respectfully requests that one be issued at the same time as the next communication from the Examiner.

This amendment is being filed concurrently with a Petition to Revive Unintentionally Abandoned Application under 37 C.F.R. § 1.137(b), and a Request for Continued Examination. Accordingly, Applicants respectfully request that prosecution be reopened, that the amendments identified herein be entered, and that the amended application be reconsidered in light of the following remarks.

Rejection Under § 112

Claim 12 stands rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Specifically, the Office Action states that the phrases “tracked imaging apparatus” and “unifier” are considered to be “new matter.” Applicants first note that the phrase “tracked imaging apparatus” was used in ***original*** claim 12, and therefore by definition cannot constitute “new matter.” Additionally, the term “unifier” has been deleted from claim 12. Therefore, Applicants respectfully requests this rejection be withdrawn.

Rejections Under § 102

Claims 1-3, 7, and 31-32 stand rejected under 35 U.S.C. § 102(b) as anticipated by the Williams article. However, Williams does not disclose or suggest an imaging apparatus having a ***plurality*** of collection devices that includes:

an ***imaging device*** configured to obtain an image of the biological system ***and a hyperspectral camera*** configured to obtain a hyperspectral data cube of the biological system; and

a ***fuser*** for fusing the image with the hyperspectral data cube

as is recited in amended claim 1. Instead, Williams discloses a multi-spectral, ***single-detector imager***. Williams discloses that the proposed imager “would condense the light from an entire selected spectral band (UV, visible, 3-5 μm , or 8-12 μm) onto a single detector element” (p. 291, col. 2). Williams discloses that such an arrangement allows for perfect pixel-to-pixel registration between the spectral bands and further “reduces the cost by replacing an expensive linear array with a single detector and size of the optical train since several optical systems are now replaced by one.” Williams discloses that the “essential component” of the system is a stationary slit placed over a spinning FM reticle (p. 291, col. 2 and Figure 1). Williams discloses that the reticle modulates different spatial locations at different temporal frequencies, and that these locations are optically condensed onto the single detector (p. 291, col. 2).

Even if such an imager is construed, for the sake of argument, to be equivalent either to the claimed imaging device or the claimed hyperspectral camera, Williams cannot reasonably be

construed as disclosing or suggesting anything resembling a **plurality** of collection devices that includes **both** an imaging device **and** a hyperspectral camera, as is claimed. Indeed, Williams teaches away from devices that include more than a single sensor.

Further, Williams does not teach or suggest “a fuser for fusing the image with the hyperspectral data cube to obtain a measure of a physiological function of the biological system,” as is recited in amended claim 1. The Office Action alleges at page 3 that Williams discloses “a fuser for fusing a thermal image or other imaging modalities and hyperspectral data cube for assessment of biological processes,” but points to no specific portion of Williams as disclosing such a feature. Applicants have reviewed the Williams reference and have been unable to identify anything reasonably resembling a fuser such as recited in claim 1. Indeed, because Williams does not disclose or suggest an imaging device configured to obtain an image and a hyperspectral camera configured to obtain a hyperspectral data cube, Williams is necessarily **silent** on a fuser for using such an image with such a hyperspectral data cube.

Therefore, for at least the reasons given above, Applicants respectfully submit that Williams does not anticipate claim 1, nor any claims depending therefrom.

Rejections under § 103

Claims 4-6, 8-12, 33-35, and 37-40 stand rejected under 35 U.S.C. § 103(a) as unpatentable over the Williams article in view of Mooradian and Lillquist. However, Mooradian and Lillquist do not cure the above-noted deficiencies of Williams. Like Williams, Mooradian discloses an imaging system including only a **single** imaging device – detector 38 (col. 5, lines 35-37). Mooradian does not teach or suggest a **plurality** of collection devices that includes **both** an imaging device **and** a hyperspectral camera, as is claimed, let alone a **fuser** for fusing an image and a hyperspectral data cube obtained using such collection devices.

Lillquist discloses a multispectral imaging apparatus “which provides a composite visible image and a thermal-infrared image of a scene with the visible and infrared images in exact spatial registration” (col. 1, lines 23-26). According to Lillquist, the apparatus includes wavelength-independent focus reflective optical system for respectively focusing visible and infrared radiation at first and second focal planes located at the same distance from the optical

system; a visible radiation detector and an infrared radiation detector are respectively disposed in these focal planes (abstract and col. 2, lines 39-49). It is readily apparent from Lillquist that the apparatus' design is highly constrained because of the requirement that both the visible and infrared light be identically focused at the respective detectors. For example, Lillquist discloses that:

Since the optical system is non-refractive, its focus is wavelength independent. Because of the widely separated visible and wavelength bands and the *necessity* of providing a common focal plane distance for both the visible and infrared radiation, catadioptric (lens/mirror) and refractive optical systems are not suitable for the composite imaging system since the visible and infrared radiation would not be focused precisely at the same focal plane distance, which would cause problems in producing high resolution images that are in spatial registration (col. 5, line 62 to col. 6, line 4, emphasis added).

Lillquist discloses a number of design constraints for the “wavelength-independent, non-catadioptric, non-refractive reflective optical system,” including the use of a reflective Cassegrain telescope, mirrors coated with materials having optimum reflection characteristics at both visible and infrared wavelengths, a thin dichroic semiconductor beamsplitter, and an image erecting mirror (see col. 5).

Applicants respectfully submit that the systems of Williams and Lillquist are incompatible with one another, and that therefore one of ordinary skill in the art would not have had any reason even to contemplate combining the two, let alone have considered it obvious to do so. For example, as discussed above, Williams *teaches away* from the use of multiple sensors, instead disclosing that use of a single detector element allows for perfect pixel-to-pixel registration. In comparison, Lillquist is *predicated* on the use of separate visible and infrared detectors. Moreover, Williams discloses that an “essential” part of his system is a stationary slit placed over a spinning FM reticle that modulates different spatial locations at different temporal frequencies, and that these locations are optically condensed onto the single detector. By contrast, Lillquist discloses the “necessity” of providing a common focal plane distance for the visible and infrared radiation, which constrains the optical system to being wavelength-independent, non-catadioptric, non-refractive, and reflective.

In short, the explicit teachings of the two references would have led one of ordinary skill in the art to consider the systems of Williams and Lillquist to be *alternatives* to each other and not combinable in any obvious way. Indeed, the Office Action merely alleges that:

modifying the system disclosed by Roy E. [Williams] with the above discussed enhancements would have been considered obvious because such modifications would provide sufficient information from tissues for the analysis relating to diagnosis and detection of cancer (Office Action, page 6).

Applicants respectfully submit that even if one of ordinary skill in the art were motivated to obtain information from tissues, they would not have had any reason to attempt to combine Williams and Lillquist in order to do so. Moreover, the Office Action fails even to allege that one of ordinary skill in the art would have had a reasonable expectation of success in doing so.

Thus, for at least the reasons given above, Applicants respectfully submit that claim 1, and claims depending therefrom, are not obvious over any combination of the cited references.

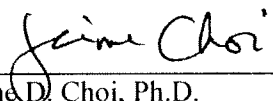
Conclusion

In light of the above amendments and remarks, Applicants respectfully request the Examiner to withdraw the rejections, and to allow the claims to issue. The Examiner is invited to call the undersigned if a telephone call could help resolve any remaining items.

No fees are believed due at this time. However, please charge any required fees, or credit any overpayments, to Jones Day Deposit Account No. 50-3013.

Respectfully submitted,

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